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## Conceptual and Empirical Pinpointing of Consciousness

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# Conceptual and Empirical Pinpointing of Consciousness

Tobias A. Wagner-Altendorf

## Abstract

Consciousness is targeted by both philosophers and neuroscientists; but different methodological premises and even different conceptions about what conscious experience is and how the challenges and potential problems associated with consciousness research should be formulated underlie the different approaches. Namely, whereas empirical data and the constant refinement of experimental procedures to expand and modify this body of empirical data and resulting empirical theories are crucial to neuroscience, the significance of empirical knowledge to philosophy is less clear: Although empirical data certainly can influence philosophical concepts, the latter are nonetheless prerequisites of empirical research itself and thus may themselves not be empirically testable. The present paper elaborates from a multidisciplinary, neuroscientist-philosopher's perspective the relation of philosophical concepts and empirical research on consciousness, drawing on two exemplary controversies from the philosophy of mind – on the ontological status of experiential properties and on free will. Consequences from both the scientific and the philosophical standpoint are discussed.

## Keywords

Neuroscience, Philosophy of Mind, Hard Problem of Consciousness, Free Will

## Introduction

Consciousness – although in the past sometimes accused of being ignored by the sciences – is targeted by several disciplines including philosophy and neuroscience. However, besides differing methodologies, philosophy and neuroscience might not even agree on the adequate definition of conscious experience as well as the adequate description of the challenges and potential problems associated with consciousness research.

As consciousness – albeit we're intimately familiar with it, more familiar probably than with every other phenomenon – has proven to be quite challenging to sufficiently define, researchers often offer an intuitive way to circumscribe it: consciousness is "what vanishes every night when we fall into dreamless sleep and reappears when we wake up or when we dream" (Tononi 2008). Ned Block, on defining (qualitative) consciousness, famously quoted – "only half in jest" – a Louis Armstrong dictum on jazz: "If you got

to ask, you ain't never gonna get to know" (Block 1978). Philosophers have used to distinguish *qualitative* or *phenomenal consciousness* from *psychological* or *access consciousness* (e.g., Block 1995, and Chalmers 1996) – with the former presumably posing the greater difficulties for, e.g., a reductionist account of the mental –, but one might question the idea of a strict dichotomy between intentional and phenomenal aspects of the mental, as every intentional reference, and ultimately every (also non-iconic) thinking, might be ascribed qualitative character (e.g., Siewert 1998). Following an intuitive definition approach, having consciousness may for the present purpose be defined as *subjectively experiencing the world from a first-person perspective*.

More generally speaking, philosophy is concerned with *conceptual* questions of consciousness: e.g., how does the concept or the notion of the mental fit with the concept or the notion of the physical? How are those two interrelated, and can one concept eventually be reduced to the other? And, to add a meta-level to the discussion: what means do we have and should we have to decide about those questions?

Another debate pointing to the conceptual nature of philosophical controversies on consciousness is the discussion of free will and agency. What is the adequate concept of free will – of a decision or of an action appropriately characterized as free –, and what does this concept presuppose about the nature or the make-up of our world? One might argue that the adequate conception of free will requires determinism, that it requires indeterminism, or that it is agnostic with respect to whether it requires determinism or indeterminism. (One might also argue that the notion of free will is inherently inconsistent in the settings of either determinism or indeterminism, and that thus there is no adequate conception of free will.) In any case, *conceptual* issues are addressed, irrespective of empirical findings.

*Au contraire*, empirical data and the constant refinement of experimental procedures to expand and modify this body of empirical data and resulting empirical theories are crucial to neuroscience: empirical research on consciousness seeks to identify brain structures and networks associated with and *responsible for* conscious experience, and, e.g., distinguish them from regions and networks involved in attentional processes or processes related to the monitoring and reporting of conscious experience. Importantly, not only a mapping of anatomical structures implicated in consciousness drives empirical research, but theorizing on the *functional* organization and interplay between distinct brain circuits necessary and sufficient for consciousness, i.e., on the neurophysiology forming the foundation of our conscious experience.

The significance of empirical knowledge to the philosopher, however, is less clear: although empirical data certainly can influence philosophical concepts, the latter are

nonetheless prerequisites of empirical research itself and thus typically themselves not empirically testable.

The present paper aims at disentangling the – often confounded – neuroscientific, i.e., empirical, and philosophical, i.e., conceptual, approaches to consciousness. To elaborate how the two are related, yet distinct, I will be drawing on two exemplary controversies from the philosophy of mind – on the ontological status of experiential properties and on free will. Consequences from a multidisciplinary perspective incorporating both the scientific and the philosophical standpoint are discussed.

### **Consciousness, the Ontological Status of Experiential Properties, and Empirical Research**

Consciousness, as stated in the introduction, is hard to define; and despite of us being immediately familiar with “conscious experience,” it is probably not one single and homogenous phenomenon, but is having different yet related aspects. One common distinction, as noted, is to discriminate the functional aspects of consciousness from its qualitative aspects, or “access consciousness” from “phenomenal consciousness.” As another term, roughly equating “phenomenal,” philosophers have coined the notion of the “experiential,” i.e., experience-related or experience-bearing properties (with experience understood as essentially qualitative, phenomenal experience).

The ontological status of experiential properties has been extensively discussed in the philosophical literature over the past decades: can their qualitative character eventually be reduced to the (non-qualitative) character of physical properties? Reductive physicalism emphatically endorses a positive answer, pointing to eventually-shown-to-be-reducible properties such as liquidity, heat and life, whereas non-reductive positions, namely dualism and non-reductive physicalism, deny the reducibility of the experiential, referring to the now-classical anti-reductionist arguments, e.g., by Nagel (1974), Jackson (1982), and Chalmers (1996).

My point here is not in debating reductionist vs. anti-reductionist arguments, but to relate this conceptual philosophical debate to (empirical) neuroscience. An extensive, and ever more rapidly increasing, body of empirical research has been built up, in search for and in pinpointing of what has been called “the neural correlate(s) of consciousness” (NCC) (Crick & Koch 1998). Importantly, the search not only for correlational, but for *causal* relations between (a specific type of) conscious experiencing and (a specific type of) brain activation pattern drives neuroscientific research: to identify the “minimum

neural mechanisms jointly *sufficient* for any one specific conscious experience” (Koch et al. 2016; my emphasis).

Empirical theories on (the neural correlates and causes of) consciousness have taken different stances on explaining consciousness on a (neuro-)biological basis, and on disentangling “true” NCCs from “mere” neural prerequisites and/or consequences of consciousness (see Seth & Bayne 2022, for a recent review). The most influential empirical theories of consciousness include global workspace theories – holding that an item becomes conscious through “information broadcasting” within a widespread neuronal “workspace” including parietal and prefrontal areas, with the P3b being the hallmark electrophysiological index of conscious access (e.g., Dehaene & Changeux 2011; Mashour et al. 2020) –, integrated information theories – holding that physical systems are the basis for consciousness precisely if they constitute a network combining functional specialization with functional integration, so that their integrated information is high (e.g., Tononi 2008; Tononi et al. 2016) –, and re-entry theories – holding that recurrent processing is the crucial neural ingredient of consciousness, and thus assuming that phenomenal consciousness is possibly much more widespread than our *access* to and later reporting on it (e.g., Lamme 2006 2010).

It is not the aim of the present paper to compare the different empirical theories of consciousness, but to, meta-empirically, contrast them to a philosophical approach to consciousness. So – how do neuroscience and empirical research relate to the *concepts* of consciousness in the philosophy of mind, and to the conceptual philosophical questions about, e.g., the ontological relation of the notions of the mental and the physical?

One might assume that neuroscientific theories philosophically favor a reductionist, i.e., a physicalist account of the mental over the non-reductionist account. And indeed, dualistic theories – being the prime example of a non-reductionist account of the mental – have been harshly attacked by some scientists, and attributed, e.g., a “misguided intuition” (Dehaene 2014, 2), as if they were at odds with neuroscience.

Obviously, however, the case is not as clear-cut. This can be illustrated considering particular philosophical positions. Think, to begin with, of the mental-to-physical reductionist view: *strictly speaking* – it’s saying – *there is nothing mental as an entity of its own; the mental eventually reduces to the physical. (The physical world, in particular our brain, makes up the mind.)* And now consider the very *opposite* philosophical view – also reductionist, but in the physical-to-mental direction: *strictly speaking, there is nothing physical as an entity of its own; the physical eventually reduces to the mental. (The mind makes up the physical world, including our brain.)*

The two positions couldn't philosophically be more divergent – but it seems very hard to decide upon and between them based on empirical measures, and it is reasonable to assume that proponents of each position would consider their view to perfectly fit with what science has told us and will tell us.

Science provides us, says the mental-to-physical reductionist, with an increasingly detailed picture about how physical processes underlie mental processes, thus bolstering the idea that the physical is fundamental. Every scientific finding, says the physical-to-mental reductionist, is a *finding*, confirming or rebutting hypotheses and leading to theories, all of which are mental entities, which thus should be considered fundamental – not to speak of the fact that mental activity underlies any scientific activity.

So, obviously the same empirical data is compatible with two strongly differing philosophical positions. Likewise, philosophical dualists can and actually do simply claim that empirical data *per se* do not conflict with dualism (see, e.g., Lowe 2006), but rather certain presumptions and *a priori* conceptual framings *applied* to the empirical data.

It is a widely accepted cliché that Descartes' interactionist dualism was common and unquestioned at his time, and declined in plausibility as scientific progress was made. But in fact, the major systematic flaw of interactionist dualism – not being able to provide a sufficient account of mental causation – kept most of his contemporaries from endorsing Descartes' position. As Jaegwon Kim points out, "it is more than a little amazing to realize that Descartes was an exception rather than the rule, among the great Rationalists of his day, in defending mental causation as an integral element of his view of the mind" (Kim 2005, 8), in contrast to, e.g., Leibniz's parallelism and Spinoza's double aspect monism.

So, obviously, interactionist dualism, although perhaps in keeping with commonsense, has always had a hard time in the philosophy of mind – for its serious conceptual and systematical, i.e., philosophical, shortcomings –, irrespective of knowing or not knowing 20<sup>th</sup> and 21<sup>st</sup> century neuroscience.

Generally speaking, the position put forward here suggests that the ontological status of experiential properties – whether they eventually are identical or not identical with non-experiential properties, i.e., the physicalist versus the (property) dualist standpoint – will be debated on the basis of conceptual, not empirical, means.

That said, empirical data on (qualitative and quantitative) consciousness can – beyond hard philosophical categorizations – significantly shape our thinking and our conception of consciousness. From a clinical standpoint in particular striking is the idea of establishing methods to study and evaluate the neural correlates of consciousness *in a single individual*, and to determine the state or level of consciousness via neuroscientific means in cases where the individual's behavior does not give a definite indication of

their level of consciousness. E.g., proponents of the global workspace theory have argued that, on the basis of this theory, predictions on an individual's consciousness level (and on the future clinical outcome) can be made, and provided evidence for the evaluation of consciousness on the basis of event-related EEG potentials (Bekinschtein et al. 2009; Faugeras et al. 2012). Integrated information theory has also been claimed of being able to extrapolate and make inferences about consciousness in clinically or behaviorally unclear cases (Tononi & Koch 2015), although the theory provides a more abstract and mathematical approach.

Relevant cases for determining the level of consciousness via neuroscientific methods include neurological patients with severe clinical impairment of quantitative consciousness but however circumscribed brain lesions: empirical theories of consciousness, and the brain measuring methods involved in establishing it, could help to differentiate, e.g., cases of locked-in syndrome (i.e., a state of fully preserved consciousness without ability to behaviorally respond) from unresponsive wakefulness (i.e., a state without consciousness) – in particular cases of complete locked-in syndrome, where not only horizontal, but also vertical eye movements are affected due to lesions extending from the pons to the ventromedial midbrain (Bauer et al. 1979; Das et al. 2021), and thus even the minimal behavioral response usually indicating conscious experience in locked-in patients is not preserved. Other potential applications of empirical measurements of (levels of) consciousness include newborn babies, animals, and possibly one day even complicated machines and artificial intelligence (Tononi & Koch 2015).

Another fascinating way how neuroscience could change our understanding of consciousness (and of ourselves as conscious beings) is that it could equip us with methods to distinguish phenomenal consciousness itself from the mere "reportability" of conscious content. Consciousness – so it seems reasonable to assume – is about what is conscious at the very moment of experiencing it, and not about what can be reported afterwards: it could be that our conscious experience is much richer than what we can report and what we can even remember one moment later – and neuroscience will enable us to study these phenomenal qualities that are even inaccessible to the subject's own thinking (Lamme 2010).

Here, however, conceptual stipulations and philosophical presumptions are looming again: take, for the sake of the argument, an eliminativist stance towards qualia. Then, reportability of conscious content simply is *all there is* to consciousness: it makes no sense to speak of phenomenal awareness irrespective of its being remembered or reported, because such processes were indiscernible from unconscious processes. Whether to term them conscious (but instantly forgotten) or unconscious does not pick out any

real difference in the world; it's simply an arbitrary decision about naming things. This, of course, is an untenable claim to the realist about qualia: whether or not we have qualitative consciousness at a given moment – irrespective of its consequences – makes a huge, perhaps maximal, difference.

### **Agency, Freedom, and Empirical Determinants**

The topic of free will – of free acts and free decisions – has been widely debated in philosophy, although mostly not as part of the mind-body problem, which mainly focusses on consciousness in the strict sense. (It may be, however, that the problem of free will *should* be considered as integral part of the mind-body problem and as its second “dimension” next to conscious experience; see, e.g., Griffin 1998, for putting forward this view.) The concept of *freedom* can be supplemented by the concept of *agency*: what does it mean to “act,” and what distinguishes actions from mere happenings (perhaps with an intermediate step between actions and happenings called “doings”; see, e.g. Nida-Rümelin 2007)?

Much of the debate has focused on whether free will requires indeterminism (i.e., the incompatibilist view of freedom and determinism, or the libertarian view of freedom), or whether it is compatible with determinism (i.e., the compatibilist view). Sometimes it is argued that even (an adequate concept of) agency, and not only of free will, requires a form of indeterminism (Stewart 2012).

I will not opt for either side here (arguments for both sides will be presented in the following), but try to relate conceptual philosophical issues to some empirical findings and their implications on acting and (free) decision making.

Arguably, the best known and most influential neurophysiological experiments on free will and decision making are the Libet experiments conducted in the 1980s, showing, in a voluntary and “spontaneous” movement task, the scalp-measured Bereitschaftspotential – indexing (supplemental) motor cortex activation – to precede the conscious decision to move (as determined through the subject’s recall of the spatial “clock-position” of a revolving spot) by several hundreds of milliseconds (Libet et al. 1982 1983; Libet 1985).

Many subsequent studies then have targeted the unconscious precursors of conscious decisions (and addressed some of the methodological problems of Libet’s original experiments), generally confirming that predictors of the outcome of a decision can be detected some time before the decision becomes conscious. E.g., Fried et al.



(2011) report, in an intracranial EEG study, single supplementary motor area neurons to predict an impending decision to move several hundreds of milliseconds prior to volition. Notably, Soon et al. (2008) found the local spatial pattern of fMRI responses in frontopolar and parietal cortical areas to differ with respect to a spontaneous voluntary button press with the right or left index finger that occurred up to 10 seconds later.

According to one interpretation of the Libet and following experiments, these findings exclude a causal role of the conscious decision, making it a mere epiphenomenon that occurs only after the “true” decision has already been made unconsciously – albeit Libet himself favored a “veto” view of the (conscious) will, according to which it still holds the “possibility of stopping or vetoing the final progress of the volitional process” (Libet 1999). (The possibility that the veto decision itself would be preconditioned or determined by preceding unconscious processes was obviously dismissed by Libet.)

The crucial *conceptual* question, however, of whether an adequate definition of freedom and free decision-making should exclude the preconditioning of an act or a decision by antecedent events is hardly satisfactorily addressed in most of the empirical literature (but see, e.g., Roskies 2010, for a discussion).

Libet obviously favored an incompatibilist view of freedom and determinism, stating that his “operational definition of free will [...] was in accord with common views” and that a position according to which “consciously willed acts are fully determined by natural laws [...] would make free will illusory” (Libet 1999); however, he seems not to be discussing arguments for this pre-empirical choice itself.

The philosophical alternative between compatibilism – the view that free will and determinism are compatible – and libertarianism – the view that they are not; and that we must assume indeterminism to secure free will – sometimes is formulated such that our natural intuitions, or common sense, are pushing us towards libertarianism, whereas the sciences (not only neuroscience; also such other empirical disciplines as genetics or developmental psychology, cultural and historical sciences and so forth) push us towards compatibilism, pointing to the multiple antecedents and constraints to which our actions are subject.

Although there is some truth to this statement, I don’t believe this is the best way to put it. It is true that strong intuitions speak in favor of incompatibilism; however, evenly strong intuitions speak in favor of compatibilism – so that the compatibilism-libertarianism alternative is best described as a struggle between *different intuitions* about ourselves as acting and deciding subjects. I will briefly elaborate the two major conceptual, i.e., pre-empirical, pro-incompatibilism and pro-compatibilism arguments.

The *Consequence argument* for incompatibilism is usually attributed to Peter van Inwagen, although it can be traced back to scholasticism and probably to ancient Greek philosophy (Jäger 2013). It focusses on the idea of alternative possibilities to act, which is core to our sense of freedom. If determinism is true – says the argument –, then each state of the world, including my actions, is necessitated by its preceding state (and by the laws of nature), and the preceding state again is necessitated by the pre-preceding state, and so forth, up to events in the remote past. If, however, my acts and decisions are an inevitable consequence of events in the remote past (and of the laws of nature), both of which are not up to me, then also my acts (and my decisions) are not up to me, and I cannot be attributed free will (Van Inwagen 1983).

The pro-compatibilist argument – sometimes referred to as *Mind argument*, as it was formulated in several publications in the namesake journal – acknowledges that the idea of alternative (originally called “alternate,” see Frankfurt 1969) possibilities is crucial to our sense of freedom, but however argues that it is essentially misunderstood in the incompatibilist paradigm. Surely, the compatibilist argument goes, we have the freedom to act otherwise – but only if the past, i.e., our thoughts, our intentions and decisions, would have been otherwise. The libertarian view evoking an *indeterministic* relationship between reasoning and deciding, deciding and acting – stipulating that a given past, including my own reasoning and deciding, can lead to different, “branching” futures of acting – provides no coherent idea of freedom, but only of randomness and arbitrariness. An adequate concept of freedom, thus, it not only consistent with but *requires* determinism; and the difference between freedom and unfreedom lies in the right *kind* of determination of the present and future by the past.

So, the Consequence argument relies on the strong intuition that, given exactly the same past including our own reasoning, we have different options of deciding and acting, whereas the Mind argument relies on the equally strong intuition that the very same reasoning leading to differing decisions and actions would not constitute freedom, but rather a kind of randomness seeming undesirable and perhaps upsetting.

Another question related to determination is whether free choices must not be *predictable*. E.g., Libet (1999) seems to adopt this view, stating – after having asserted that free will is incompatible with determinism – that “even if events are not predictable in practice, they might nevertheless be in accord with natural laws and therefore determined,” suggesting that predictability is a sufficient (although not necessary) condition for an event, such as a human action or decision, not to be counted as free.

The view that predictability excludes freedom might, however, be questioned: why should a predictable or foreseeable action be less free than an unpredictable, spontaneous

one? Freedom seems to be confused with arbitrariness here. After all, it's easy to imagine cases with a near-to-100% predictability of a person's action – being the prediction based on neuroscience or on common sense – with being it nonetheless a prime example for a free action (see, e.g., Nida-Rümelin 2018, for several examples of predictable and “psychologically determined” [as opposed to “microphysically determined”] free actions). It seems thus fair to say, I would like to stress, that strong intuitions are pointing us to the compatibility of freedom and predictability.

However, my point here lies not in putting forward compatibilist arguments against the incompatibilism that Libet and others tacitly seem to presuppose – I'm remaining neutral here with regard to the compatibilist vs. libertarian alternative –, but in emphasizing that the *most relevant* questions about free will and agency are of conceptual nature, i.e., in determining whether conditioning by the past renders freedom impossible, or, on the contrary, freedom precisely consists in the right kind of human actions and decisions being conditioned by preceding events.

So – if conceptual arguments and assumptions (logically, not temporarily) precede empirical data, what then, conversely, is the impact of empirical results on the conceptual debate? Universal determinism, to be sure, is a metaphysical, not a physical, thesis; however, a scientific picture of the world, as fleshed out by the numerous empirical disciplines, might still make us inclined towards compatibilism rather than libertarianism: as the empirical data – of neuroscience, to begin with, but also of many more empirical disciplines including the social sciences – emphasizes the many factors that condition human deciding and acting, the compatibilist picture, with its localization of freedom *within* an overall framework of past events necessitating present and future events, although not directly empirically provable, may look more attractive.

## Conclusions

Addressing consciousness – both the ontology of conscious experience itself as well as the (free) agency of consciously experiencing subjects – in a multidisciplinary manner from both a philosophical and a scientific stance reveals that the problems or questions of both disciplines are *distinct*: philosophical concepts are typically not themselves empirically testable; and one discipline is unlikely to replace the other.

While philosophy's approach will ponder the impact of empirical data on (pre-empirical) philosophical concepts, the neuroscientific stance will elaborate the implications and consequences of empirical findings starting from a given concept.

An example for the latter, in the case of consciousness, might be Tononi's approach to the integrated information theory: instead of "trying to 'distill' mind out of matter" (which – if possible or not – would be a conceptual undertaking), he suggests to "start from consciousness itself, by identifying its essential properties, and then ask what kinds of physical mechanisms could possibly account for them" (Tononi & Koch 2015).

Maybe philosophical and empirical theories should even be combined to sufficiently account for conscious experience. The philosopher Gregg Rosenberg opts for combining his theory of natural individuals (TNI) – linking intrinsic experiential properties and causation within a complex panexperientialist hierarchy of individuals – with the integrated information theory (IIT): "By joining TNI and IIT, one gets both a metaphysics and a physics for understanding the presence of consciousness in our world: *why* is it present; *where* is it present; and *how much* is present. TNI adds to IIT a deeper but still naturalistic explanation of why integrated information is experiential." (Rosenberg 2016, 171)

Whether those alliances will prove to be fruitful is itself an empirical question (given an adequate empirical definition of "fruitful"), that the upcoming decades of research will be answering. In any case, multidisciplinary and intersectional perspectives including both philosophy and neuroscience are needed to pinpoint the concepts, correlates and causes of conscious experience.

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